

Oled Display And Oled Lighting Technology And

OLED Displays and Lighting OLED Displays and Lighting Organic Light-Emitting Diodes (OLEDs) Assessment of Solid-State Lighting, Phase Two The OLED Handbook (2019 edition) Novel Approaches for Improving the Performance and Reliability of OLED Lighting OLED Display Fundamentals and Applications OLED Fundamentals International Conference on Solid State Lighting Ultra Clean Processing of Semiconductor Surfaces XV Organic Light-emitting Materials and Devices Achieving Energy-efficient Lighting in California Organic Light-emitting Materials and Devices VIII Advanced Materials and Processes III Principles and Applications of Organic Light Emitting Diodes (OLEDs) Information Display Chemistry and Industry Laser Focus World Japanese Journal of Applied Physics Electronic Business Mitsuhiro Kodon Mitsuhiro Kodon Alastair Buckley National Academies of Sciences, Engineering, and Medicine Ron Mertens Taehwan Kim Takatoshi Tsujimura Daniel J. Gaspar Paul W. Mertens Zakya H. Kafafi Sheng Li Li N. Thejo Kalyani

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light emitting diodes oleds have emerged as the leading technology for the new display and lighting market oleds are solid state devices composed of thin films of organic molecules that create light with the application of electricity oleds can provide brighter crisper displays on electronic devices and use less power than conventional light emitting diodes leds or liquid crystal displays lcds used today this book covers both the fundamentals and practical applications of flat and flexible oleds key features covers all of the aspects necessary to the design and manufacturing of oled displays and lighting explains the fundamental basic technologies and also related technologies which might contribute to the next innovation in the industry provides several indications for future innovation in the oled industry includes coverage of oled vacuum deposition type and solution type materials the book is essential reading for early career engineers developing oled devices and oled related technologies in industrial companies such as oled device fabrication companies

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organic light emitting diodes oleds are opening up exciting new applications in the area of lighting and displays oleds are self emissive and by careful materials and device design can generate colours across the visible spectrum together with simple monolithic fabrication on a range of different substrates these diverse material properties give oleds key advantages over existing display and lighting technology this important book summarises key research on materials engineering and the range of applications of these versatile materials

part one covers materials for oleds chapters review conjugated polymers transparent conducting thin films iridium complexes and phosphorescent materials part two discusses the operation and engineering of oled devices chapters discuss topics such as highly efficient pin type oleds amorphous organic semiconductors nanostructuring techniques light extraction colour tuning printing techniques fluorenone defects and disruptive characteristics as well as durability issues part three explores the applications of oleds in displays and solid state lighting applications discussed include displays microdisplays and transparent oleds sensors and large area oled lighting panels organic light emitting diodes oleds is a standard reference for engineers working in lighting display technology and the consumer electronics sectors as well as those researching oleds summarises key research on the materials engineering and applications of oleds reviews conjugated polymers transparent conducting thin films considers nanostructuring oleds for increasing levels of efficiency

the standard incandescent light bulb which still works mainly as thomas edison invented it converts more than 90 of the consumed electricity into heat given the availability of newer lighting technologies that convert a greater percentage of electricity into useful light there is potential to decrease the amount of energy used for lighting in both commercial and residential applications although technologies such as compact fluorescent lamps cfls have emerged in the past few decades and will help achieve the goal of increased energy efficiency solid state lighting ssl stands to play a large role in dramatically decreasing u s energy consumption for lighting since the publication of the 2013 national research council report assessment of advanced solid state lighting the penetration of ssl has increased dramatically with a resulting savings in energy and costs that were foreshadowed by that study what was not anticipated then is the dramatic dislocation and restructuring of the ssl marketplace as cost reductions for light emitting diode led components reduced profitability for led manufacturers at the same time there has been the emergence of new applications for ssl which have the potential to create new markets and commercial opportunities for the ssl industry assessment of solid state lighting phase two discusses these aspects of changeâ highlighting the progress of commercialization and acceptance of ssl and reviewing the technical advances and challenges in achieving higher efficacy for leds and organic light emitting diodes this report will also discuss the recent trends in ssl manufacturing and opportunities for new applications and describe the role played by the department of energy doe lighting program in the development of ssl

the oled handbook is a comprehensive guide to oled technology industry and market brought to you by oled info edition 2019 the oled handbook provides a great introduction to the world of oleds and covers everything you need to know about the oled industry market and technology it is an invaluable guide for display engineers business developers researchers equipment vendors oled material companies private investors and anyone who wants to learn more about oleds today and in the future

organic light emitting diodes oleds have recently been widely adopted for display gadgets such as smart phones and televisions for their excellent picture qualities and flexible form factors following the success of oleds in displays another potential application of oleds is lighting though oled lighting still has high manufacturing cost 100 klm which is the major barrier to commercialization it has achieved comparable performances with its counterpart led lighting such as lifetime over 50 000 hours efficacy over 100 lm w and color rendering index cri over 90 with the diverse form factors that led lighting cannot represent oled lighting will be able to create its own applications in the lighting market when the manufacturing costs of oled lighting are low enough to be adopted in the market in this dissertation three research works that i did during my ph d study for improving the performance and reliability of oled lighting are demonstrated and i am honored to have had opportunities to conduct research in the emerging area of oled lighting during my ph d study as an attempt to develop highly efficient and long lifetime oled lighting firstly the oled fabricated on a high aspect ratio substrate with microscale patterns is proposed to pack more light emitting areas per unit substrate area since a high aspect ratio oled has increased amounts of light emitting areas light outputs per substrate compared with a planar oled it needs reduced driving voltage and current density to produce the same light outputs that a planar oled did and this reduced current density of a high aspect ratio oled is expected to improve the lifetime and efficiency of oled subsequently to fabricate the oled on the high aspect ratio substrate with microscale patterns by thermal evaporation as proposed conformal depositions of organic and metal layers on the high aspect ratio substrate are essential to prevent potential oled device failures from hot spots generally originated from non uniform layer depositions so here i developed three deposition models i e i deposition with a simple rotation ii deposition with a planetary rotation and iii an in line deposition for thermal evaporation in matlab to understand and optimize the uniformity in deposition thickness on the high aspect ratio substrates e g 1d 2d modulated sinusoidal triangular substrates the established models in matlab found that the uniformity in deposition thickness

degrades as the width of the substrate enlarges e.g. from 1 mm to 5 cm at all three deposition models owing to the increasements of local deposition angles on the substrate and the near unity deposition uniformity on the slopes is achieved by the in line deposition with an evaporant mask model and by the simple rotation model with optimizing the substrate width for the best thickness uniformity at the given aspect ratios of the substrate e.g. for the substrate with aspect ratio p/k p/k period 40 μm 40 μm the best thickness uniformity is attained at the substrate width of 5 cm though both deposition models can attain conformal deposition thickness on the slopes of the substrate there are still differences in deposition thickness at the slopes and the peaks troughs that stem from the different geometric shapes of the substrate patterns themselves i.e. slopes and peaks troughs which lead to differences in local deposition angles between them and ultimately result in non uniform deposition therefrom the second research topic in this dissertation is the investigation of electrical injection and transport in teflon diluted hole transport material of oled in earlier research in our group by jared et al we observed enhanced thermal and morphological stability in teflon diluted hole transport material of oled owing to a higher glass transition temperature of teflon and repolymerized nanoscale teflon networks between the hole transport small molecules that hinder gross movement and reorganization of hole transport molecules associated with crystallization and melting at the same time the hole only devices made from this teflon diluted hole transport material showed increased current density and reduced driving voltage which are beneficial electrical characteristics for oled but the origins of these electrical improvements whether they are from charge injections or from charge transports had not been clearly understood at that time in chapter 4 we investigated how charge injections interface energetics are affected by teflon components at the anode and cathode interfaces and electroabsorption measurements were able to quantify the changes in built in potentials v_{bi} of the hole only device by the teflon fractions at both interfaces and interpreting these v_{bi} changes in the context of a simple metal insulator metal model implies that teflon reduces the hole injection barrier at both the anode and cathode in addition charge transports in teflon diluted hole only devices were analyzed by time of flight mobility measurements and temperature dependent j_v measurements and they showed 4-10x decreased hole mobility in teflon diluted hole only devices over the neat hole only device though they had reduced energetic disorders upon dilution these results indicate that the main effect of teflon in bulk is to frustrate percolation transport geometrically by forcing longer hops on average and the current density improvement in teflon diluted hole only devices is from improved hole injection and not from a mobility enhancement due to semiconductor dilution

effects kirigami inspired three dimensional oled lighting concepts in chapter 5 lastly we made 3d oled lighting prototypes with four different designs pyramidal candle flame globe and window blind like panel by applying kirigami the japanese art of paper cutting and folding technique to oled devices fabricated on tens of micron thick planar clear polyimide substrate the fabricated prototype oleds are optoelectrically characterized inside the solar cell made integrating cube 6 x 6 and 3d oleds largely retain electrical performance and efficiency of the original 2d planar devices this work shows the artistic opportunities with diverse designs in oled lighting by kirigami and suggests a general opportunity to create 3d organic optoelectronic devices from flexible thin film devices fabricated using established thin film growth and fabrication methods on planar substrates

this new edition specifically addresses the most recent and relevant developments in the design and manufacture of oled displays provides knowledge of oled fundamentals and related technologies for applications such as displays and solid state lighting along with processing and manufacturing technologies serves as a reference for people engaged in oled research manufacturing applications and marketing includes coverage of white color filter technology which has become industry standard technology for large televisions

a comprehensive source for taking on the next stage of oled r doled fundamentals materials devices and processing of organic light emitting diodes brings together key topics across the field of organic light emitting diodes oleds from fundamental chemistry and physics to practical materials science and engineering aspects to design and ma

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principles and applications of organic light emitting diodes oleds explores the ways in which the development of organic semiconductor materials is opening up new applications in electronic and optoelectronic luminescent devices the book begins by covering the principles of luminescence and the luminescent properties of organic semiconductors it then covers the development of luminescent materials for oleds discussing the advantages and disadvantages of organic versus inorganic luminescent materials the fabrication and characterization of oleds is also covered in detail including information on and comparisons of vacuum deposition and solution techniques finally applications of oleds are explored including oleds in solid state lighting colored lighting displays and potential future applications such as ultra thin and flexible technologies this book is an excellent resource both for experts and newcomers to the field of organic optoelectronics and oleds it is ideal for scientists working on optical devices lighting display and imaging technologies and for all those engaged in research in photonics luminescence and optical materials provides a one stop guide to oled technology for the benefit of newcomers to the field of organic optoelectronics comprehensively covers the luminescent properties of organic semiconductors and their development into oled materials offers practical information on oled fabrication and their applications in solid state lighting and displays making this essential reading for optoelectronics engineers and materials scientists

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